

What is claimed is:

1        1.        A method for securing ventilation cloth to a screen frame, comprising the steps of:  
2                (a)        orienting a screen frame in an approximately vertical position, the screen  
3 frame having a plurality of segments, each segment having a mounting surface on a face  
4 thereof, at least one of said segments having adhesive on the mounting surface thereof;  
5                (b)        hanging a ventilation cloth across the mounting surface of said one  
6 segment;  
7                (c)        providing adhesive in said at least one of the segments;  
8                (d)        inserting the ventilation cloth in the adhesive across a length of said one of  
9 the segments.

1        2.        The method of claim 1, wherein step (c) includes melting the adhesive.

1        3.        The method of claim 2, wherein:  
2                each of the segments has adhesive on the mounting surface thereof;  
3                step (b) includes hanging the ventilation cloth across the mounting surface each  
4 segment simultaneously;  
5                step (c) includes melting the adhesive on all of the segments; and  
6                step (d) includes inserting the ventilation cloth in the adhesive across a length of  
7 each of the segments.

1        4.        The method of claim 1, wherein step (a) includes orienting the frame in a position  
2 between 0 and 30 degrees from vertical.

1        5.        The method of claim 1, wherein step (d) includes pushing the screen into the  
2 adhesive along said one side with an elongated insertion member.

1        6.        The method of claim 1, further comprising the step of clamping the screen frame  
2 on four sides simultaneously, before step (b).

1 7. The method of claim 6, wherein the clamping step includes compressing the  
2 frame from the outside on all four sides.

1 8. The method of claim 5, further comprising, before step (b), the step of loading the  
2 frame into a side of an apparatus in which the insertion is performed.

1 9. A method for securing a ventilation cloth to a screen bar segment, comprising the  
2 steps of:

3 (a) providing a screen bar segment having a mounting surface on a face  
4 thereof, the segment having adhesive on the mounting surface;

5 (b) spreading the ventilation cloth across the mounting surface of the screen  
6 bar segment;

7 (c) melting the adhesive;

8 (d) inserting the ventilation cloth into the adhesive with an elongated insertion  
9 member that extends substantially across a length of the screen bar segment.

1 10. The method of claim 9, wherein step (d) is performed by moving the insertion  
2 member in a single motion normal to the plane of the ventilation cloth.

1 11. The method of claim 9, further comprising:

2 applying a release coating to the plurality of elongated insertion member before  
3 step (d).

1 12. The method of claim 9, wherein the screen bar segment is included in a screen  
2 frame having at least three segments, the method further comprising orienting the screen  
3 frame in an approximately vertical position before step (b).

1 13. The method of claim 12, wherein

2 each of the segments has adhesive on the mounting surface thereof;

3 step (b) includes hanging the ventilation cloth across the mounting surface each  
4 segment simultaneously;

5 step (c) includes melting the adhesive on all of the segments; and  
6 step (d) includes inserting the ventilation cloth in the adhesive substantially across  
7 the length of each of the segments.

1 14. Ventilation cloth insertion apparatus, comprising:  
2 a fixture that orients a screen frame in an approximately vertical position, the  
3 screen frame having a plurality of segments, each segment having a mounting surface on  
4 a face thereof, at least one of said segments having adhesive on the mounting surface  
5 thereof; and  
6 at least one insertion device that inserts a vertically positioned ventilation cloth in  
7 the adhesive substantially across a length of said one of the segments.

1 15. The apparatus of claim 14, further comprising a hanger that hangs the ventilation  
2 cloth across the mounting surface of said one segment.

1 16. The apparatus of claim 14, further comprising a heater that melts the adhesive in  
2 said one of the segments.

1 17. The apparatus of claim 14, wherein each of the segments has adhesive on the  
2 mounting surface thereof; the apparatus further comprising:  
3 a hanger that hangs the ventilation cloth across the mounting surface each  
4 segment simultaneously; and  
5 a heater that melts the adhesive on all of the segments;  
6 wherein the apparatus includes at least one insertion apparatus for each respective  
7 segment of the frame, for inserting the ventilation cloth in the adhesive across the length  
8 of each of the segments.

1 18. The apparatus of claim 14, wherein the fixture orients the frame in a position  
2 between 0 and 30 degrees from vertical.

1 19. The apparatus of claim 14, wherein the insertion device is a band or elongated  
2 insertion member extending substantially across the length of the segment.

1 20. The apparatus of claim 14, further comprising means for clamping the screen  
2 frame on four sides simultaneously.

1 21. The apparatus of claim 20, wherein the clamping means includes means for  
2 compressing the frame from the outside on all four sides.

1 22. The apparatus of claim 20, wherein the clamping means includes at least one  
2 clamping device on a side of the apparatus, said at least one clamping device being  
3 capable of movement in a direction normal to a plane in which the frame is positioned to  
4 allow the frame to be loaded into the apparatus by way of the side on which said at least  
5 one clamping device is located.

1 23. The apparatus of claim 14, wherein the fixture includes a fixed arm and three  
2 movable arms, the movable arms being positionable for clamping frames having multiple  
3 sizes between the fixed and movable arms.

1 24. The apparatus of claim 23, wherein one of the movable arms is movable in a first  
2 direction parallel to a length thereof and movable in a second direction perpendicular to  
3 the length thereof.

1 25. The apparatus of claim 23, wherein each movable arm is movable within a  
2 respective pair of slidable yolks.

1 26. The apparatus of claim 23, wherein each arm is positioned substantially at the  
2 same height, measured from a plane in which the ventilation cloth lies.

1 27. Ventilation cloth insertion apparatus, comprising:  
2 a fixture that clamps a screen frame, the screen frame having a plurality of  
3 segments, each segment having a mounting surface on a face thereof, at least one of said  
4 segments having adhesive on the mounting surface thereof,

5           said fixture having a plurality of clamping arms, said clamping arms being  
6           positionable so that each clamping arm clamps a respective side edge of a respective one  
7           of the plurality of sides of the screen frame while attaching a ventilation cloth to the  
8           screen frame, wherein each of the plurality of clamping arms is positioned at a common  
9           height with respect to a plane in which the ventilation cloth is positioned;  
10           at least one insertion device that inserts a ventilation cloth in the adhesive  
11           substantially across a length of said one of the segments.

1       28.    The apparatus of claim 27, wherein each clamping arm clamps a respective  
2           outside edge of a respective one of the plurality of sides of the frame, the outside edges of  
3           the screen frame being the edges of the segments that are furthest from a center of the  
4           screen frame.

1       29.    The apparatus of claim 27, further comprising a heater that melts the adhesive in  
2           said one of the segments.

1       30.    The apparatus of claim 27, wherein :  
2           each of the segments has adhesive on the mounting surface thereof;  
3           the heater melts the adhesive on all of the segments; and  
4           the apparatus includes a plurality of insertion devices, each inserting the  
5           ventilation cloth in the adhesive across a length of a respective one of the segments.

1       31.    The apparatus of claim 27, wherein the apparatus includes four clamping arms  
2           forming a rectangle, and three of the four clamping arms are movable with respect to a  
3           remaining one of the arms.

1       32.    The apparatus of claim 31, wherein one of the movable arms is movable in a first  
2           direction parallel to a length thereof and movable in a second direction perpendicular to  
3           the length thereof.

1       33.    The apparatus of claim 31, wherein each movable arm is movable within a  
2           respective pair of slidable yolks.

1 34. The apparatus of claim 27, further comprising an air actuated shield for protecting  
2 a portion of the ventilation cloth adjacent to a corner key in at least one corner of the  
3 screen frame.

1 35. The apparatus of claim 27, wherein at least one clamping arm is located on a side  
2 of the apparatus and is capable of movement in a direction normal to a plane in which the  
3 frame is positioned, to allow the frame to be loaded into the apparatus by way of the side  
4 on which said at least one clamping arm is located.

1 36. A cart for transporting a frame, comprising:  
2 an L-shaped bracket having a side and a bottom portion;  
3 a plurality of clips that hold the frame on the side and bottom portion of the  
4 bracket; and  
5 a pivotally mounted finger having a first position parallel to the bracket for  
6 loading the frame onto the clips and a second position normal to the bracket.

1 37. The cart of claim 36, further comprising an actuator, wherein the bracket is  
2 mounted to the actuator.

1 38. The cart of claim 36, wherein the plurality of clips includes at least two clips on  
2 the bottom portion of the bracket.

1 39. A method for forming an assembly from screen material and a first frame having  
2 a plurality of side members, wherein the screen comes into fixative contact with the  
3 adhesive, characterized in that:  
4 adhesive is pre-heated on each side member of the first frame; and  
5 the screen is pushed using a plurality of pins on each side member of the first  
6 frame simultaneously.

1 40. The method of claim 39, wherein the frame is pre-heated in an oven to melt the  
2 adhesive.

1 41. The method of claim 39, further comprising, between the pre-heating and pushing  
2 steps, the steps of:

- 3 (1) placing the first frame on a first support at a first height;  
4 (2) clamping the frame; and  
5 (3) actuating a second support to support the screen at a second height different from  
6 the first height.

1 42. The method of claim 41, wherein the frame has four side members, and step  
2 includes:

- 3 (i) clamping the first side member of the frame;  
4 (ii) measuring a position of a third side member of the frame opposite the first side  
5 member;  
6 (iii) automatically positioning an insertion device above the adhesive on the third side  
7 member.

1 43. The method of claim 41, wherein the frame has four side members, the method  
2 further comprising, before the spreading step, the steps of:

- 3 (1) placing the first and second side members of the frame on first and second fixed  
4 frame supports;  
5 (2) automatically sliding a movable frame support under the third side member of the  
6 frame; and  
7 (3) automatically compressing the fourth side member towards the second side  
8 member with a movable clamping arm.

1 44. The method of claim 43, wherein the frame has an unknown size before step is  
2 executed.

1 45. The method of claim 39, wherein the frame has four side members, and the  
2 pushing step includes:

- 3 inserting the screen into the first and second side members with first and second  
4 fixed location insertion devices;

5 inserting the screen into the third side member with a first movable insertion  
6 device; and

7 inserting the screen into the fourth side member with a second movable insertion  
8 device that is configured to accommodate the first movable insertion device regardless of  
9 the positions of the first and second movable insertion devices.

1 46. The method of claim 39, wherein the plurality of pins are mounted on a plurality  
2 of arms, at least one of the plurality of arms being movable, the method further  
3 comprising moving the at least one movable arm after the pushing step, to form a second  
4 screen assembly having a second frame, the second frame having a different size from the  
5 first frame.

1 47. The method of claim 46, wherein half of the plurality of arms are fixed and half of  
2 the plurality of arms are movable, each fixed arm being located opposite a respective  
3 movable arm.

1 48. The method of claim 39, further comprising the steps of:  
2 (c) cooling the adhesive proximate to the pins; and then  
3 (d) removing the pins from the adhesive.

1 49. The method of claim 39, further comprising the step of cooling the pins before  
2 pushing the screen with the pins.

1 50. The method of claim 39, further comprising the step of pre-cutting the screen  
2 material to approximately a final installed size before performing the pushing step.